REMARKS

The Office Action dated April 24, 2003, has been reviewed carefully and the application has been amended in a sincere effort to place the claims in condition for allowance.

Allowable Subject Matter

Applicant acknowledges that claims 5, 8, and 18 are allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant respectfully submits that the base claim is allowable in view of arguments presented herein. Therefore, Applicant believes claims 5, 8, and 18 are now in condition of allowance.

Claim Objections

Claim 4 was objected to because of informalities. Applicant has rewritten Claim 4 making the appropriate corrections.

Claim Rejections - 35 U.S.C. § 102

Claims 1 and 19 were rejected under 35 U.S.C. Section 102(e) as being anticipated by Surampudi et al. (US 6,265,093 B1) ("Surampudi").

Regarding claims 1 and 19, briefly, Applicant's invention, is a direct oxidation fuel cell system, (that in one embodiment of the invention may be a direct methanol fuel cell system), that is responsive to an increase in demand for output power. This increase

is created by using a controller operating to actuate one or more valves to allow neat or concentrated methanol to enter the flow field.

In contrast, the Surampudi reference describes a fuel cell system in which is not responsive to an increased demand. Surampudi states a methanol sensor detects the concentration of methanol in the circulation tank, and controller uses this information to control further operations of the system. (Col .18, Lines 9-12). The methanol sensor is not triggered by an increased demand for output power rather it is continuously monitoring the level of methanol in order to keep the fuel cell system functioning regardless of demand. Further, this invention requires re-circulation. This system, unlike Applicants', will have a delay on the overall response time after the increased load.

In contrast, Applicant's invention is responsive to a change in the demand for power. During periods when the demand for power is comparatively low, a dilute fuel mixture is supplied. Conversely, when an increase in power demand is sensed by the controller, the controller opens one or more valves, thereby delivering neat or concentrated fuel directly to the diffusion layer or PCM, bypassing the typical route to the anode aspect of the membrane electrode assembly.

In addition, while Applicant's invention can be applied to a system where recirculation occurs, as taught in Surampudi, it does not require that the fuel be recirculated. Applicant's invention, in fact, provides an alternate routing for a more concentrated fuel to be delivered to the anode diffusion layer or the catalyzed membrane electrolyte, in order to minimize the time lag associated with increasing the concentration of fuel in a mixing tank or within the entire fuel cell system. Applicant's invention allows for fuel to

be saved by delivering a less concentrated fuel during lower electricity demand periods, in order to decrease methanol cross over during normal operation, while delivering a more concentrated, or neat fuel to the anode aspect of the catalyzed membrane electrolyte when demand for electricity so requires.

Thus, Surampudi does not anticipate independent claims 1 or 19, because it does not teach a responsive fuel system to increased demand as claimed by Applicant.

Claim Rejections - 35 U.S.C. § 103

Claims 3, 4, 6, and 7 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Surampudi et al. (US 6,265,093 B1) ("Surampudi") in view of Sugita et al. (US 6,350,540) ("Sugita").

Regarding claim 3, briefly, Applicant's invention, is a methanol fuel cell system that is responsive to an increase in demand for output power. By actuating one or more valves, neat or concentrated fuel may be introduced, using one or more apertures for effectively bypassing the diffusion layer in a controlled manner, thus delivering a higher concentration fuel to PCM 12 while minimizing the delays related to the lateral diffusion of a dilute fuel within the anode diffusion layer.

In contrast, the Sugita reference teaches that through a plurality of holes, which are formed through the first and second gas diffusion layers it is possible to increase the effective reaction. (Col. 6, Lines 13-20). Sugita passes all of the fuel from the flow field channel to the surface of an anode diffusion layer. In Sugita, the fuel gas then diffuses through the anode diffusion layer to either the catalyzed anode aspect of the membrane

electrolyte, or to an aperture that provides a direct path to the catalyzed anode aspect of the membrane electrolyte.

Applicant teaches a fuel delivery assemblage where concentrated fuel can be: 1) introduced to the anode surface of the diffusion layer, and pass through the diffusion layer to the catalyzed surface of the membrane electrolyte, without any apertures or other alteration of the anode diffusion layer; 2) delivered into the anode diffusion layer, where it will diffuse to the catalyzed anode aspect of the membrane electrolyte; 3) bypasses the anode diffusion layer entirely, and is introduced directly to an anode catalyst layer.

In other words, Sugita simply teaches that a plurality of holes in the anode diffusion layer increases flow of fuel to the catalyzed anode aspect of the membrane electrolyte, even where fuel is not introduced directly into said aperture. Applicant's invention allows for the delivery of a more concentrated fuel to or into an anode diffusion layer, or to the surface of a catalyzed membrane electrolyte. In contrast to the teachings of Sugita, Applicant's invention has a responsive valve system that allows the concentrated fuel to be delivered to the appropriate portion of the membrane electrolyte in a controlled manner and based on demand. Applicant's invention passes a more concentrated or neat fuel, such as methanol, on demand, directly to or into the diffusion layer or to the catalyzed aspect of the membrane electrolyte. During periods when the demand for power is not rapidly increasing, a dilute fuel mixture is supplied. Conversely, when a rapid increase in power demand is sensed by controller, the controller opens one or more of valves, thereby allowing neat or concentrated fuel to be delivered. In addition, in one embodiment of the invention, the conduits enable the fuel to bypass the diffusion layer, and to be

introduced to the anode aspect of the catalyzed membrane electrolyte directly in order to generate in a faster response.

Thus, Sugita does not teach a responsive fuel cell system based on demand that uses apertures to increase reaction as claimed by Applicant.

Regarding claims 4, 6 and 7 Applicant respectfully requests the Examiner to reconsider this rejection in view of the amendments and arguments presented herein.

Claims 15, 16, and 17 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Surampudi et al. (US 6,265,093 B1) ("Surampudi") as applied to claims 1, 19 above, and further in view of Sugita et al. (US 6,350,540) ("Sugita").

Regarding claims 15 and 16 Applicant respectfully requests the Examiner to reconsider this rejection in view of the arguments presented herein, with respect to claim 1. In that Applicant's system is responsive and delivers neat methanol on demand to or into the diffusion layer or the PCM.

Regarding claim 17 Applicant respectfully requests the Examiner to reconsider this rejection in view of the arguments presented herein.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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